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DRIVING PATTERNS OF HEAVY DUTY VEHICLES OPERATING IN THE ST. LOUIS REGIONAL AREA

EAST-WEST GATEWAY COORDINATING COUNCIL

PREPARED FOR
ENVIRONMENTAL PROTECTION AGENCY

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Office of Air and Waste Management
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Ann Arbor, Michigan 48105

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16. ABSTRACT

This survey was conducted in the St. Louis regional area and involved only those vehicles having a gross vehicle weight rating greater than 10,000 pounds. Seventy vehicles were selected for observation. Sixty-five of these vehicles were trucks and five were buses.

The chase vehicle method of collecting vehicle operational data has proven to be an expedient and very useful tool in the development of vehicle driving cycles. The method utilizes a vehicle equipped to monitor and record its own operation (i.e., speed and time) while following ("chasing") the subject vehicle. In so doing it is unnecessary to equip the subject vehicle with instruments.

The following information was recorded during each chase event: Day of the year, time of the day (~~hour-minute-second~~), truck I.D. number, area type (urban, non-urban), vehicle speed, manifold vacuum, road types (freeway, arterial, local) traffic conditions (~~free~~, stable, congested), weather type, driver-navigator I.D., catch-up mode indicator, and type of scheduled stop.

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Ann Arbor, Michigan 48105

April 1976

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PREFACE

During Fiscal Year 1975, East-West Gateway Coordinating Council assisted the Federal Highway Administration (FHWA) as part of a cooperative effort with the U.S. Environmental Protection Agency (EPA) and other Federal agencies, by collecting highway characteristics and speed data in the Metropolitan St. Louis Area, using an instrumented vehicle with an on-board computer. The data collected was given to the Federal Highway Administration (FHWA) and has been made available for use in conjunction with elements of the Regional Air Pollution Study Program and other air pollution and transportation programs in the St. Louis Region.

This effort is the second phase of this contract, DOT-FHWA-11-8563, with FHWA and has been made possible through an inter-agency agreement between the Environmental Protection Agency and the Federal Highway Administration.

Data collected in this second phase of the study may be obtained from the Office of Mobile Source Air Pollution Control in Ann Arbor, Michigan.

PURPOSE OF REPORT

The purpose of this report is to describe how truck operating characteristic data was collected from seventy heavy-duty vehicles operating in the St. Louis Region. The data is needed by the U.S. Environmental Protection Agency to evaluate and validate truck operating characteristic data previously collected in California and New York with special instruments installed in the trucks themselves. This data will provide the means to assimilate future heavy-duty vehicle driving cycles.

METHODOLOGY

The truck operating characteristic data of seventy (70) trucks and buses was collected with a specially instrumented vehicle with an on-board seven-track computer recorder, leased to the Council by the U.S. Environmental Protection Agency, Ann Arbor, Michigan. The instrumented vehicle followed pre-selected trucks throughout the St. Louis Region duplicating and simulating the trucks' operation, while the on-board computer recorded the operating characteristics of the chase car. Descriptive information for each truck chased accompanied the operating data set sent to the U.S. Environmental Protection Agency, Ann Arbor, Michigan. In addition, photographs were taken and are included in this report.

SCOPE OF WORK

(1) Truck Selection: The U.S. Environmental Protection Agency supplied the Council with a computer tape registration list of all heavy-duty vehicles registered in St. Louis City and St. Louis County. The contract specified the Council to randomly sample the registration list to obtain the types of truck prescribed in the contract and contained in Appendix A. The sample requirements basically fall into two categories, gasoline operated trucks and diesel operated trucks. These two basic categories are further stratified into two axle, three axle and tractor-trailer. Finally, these three sub-categories are further stratified by three vehicle operating ranges. The three ranges are:

Local

Local range is the local area in and around the city, suburbs, farm, factory, mine or place where the vehicle is stationed, or from where it operates.

Short

Short range is the area beyond the local area, over the road, but not more than 200 miles from the place the

vehicle is stationed or from where it operates.

Long

Long range trips are over-the-road trips more than 200 miles from the place the vehicle is stationed or from where it operates.

The Council's original plan was to sample the registration list and to select trucks by the categories specified. However, the registration list did not contain sufficient data about the trucks to allow this type of selection. The License Bureau of the State of Missouri was contacted regarding the lack of complete information on the computer list. The Bureau indicated the information was not available and there was no way around the problem. After careful study, it was determined that a base random sample of six hundred would satisfy the sampling requirements of the contract, and produce the seventy trucks required. From a sampling technique standpoint, it also provides the same statistical results as a sample by specific categories.

A table of random numbers was used to manually select the six hundred truck owners from a printout of the computer tape registration list.

Approximately 120 truck owners were contacted in the order of selection and asked to participate in the study.

Appendix B contains a breakdown of participation. Of the 120 owners contacted, about 50 percent agreed to participate. Only about 12 percent refused. Of these 12 percent, only a few owners objected vigorously; these individuals generally felt the study might interfere with their operations or that the study wasn't needed and was a waste of money. The rest of the refusals were due to policy decisions of the company. About 46 owners or 38 percent did not participate because of scheduling and operating problems.

As the Truck Chase and scheduling progressed, specific categories of trucks were completed, additional truck owners had to be contacted until certain types of trucks were located. This necessitated going out of the order of selection to obtain the right type of truck, but was still within the requirements of the contract and still provided the same statistical results.

As the project progressed, it became necessary to contact three truck owners not identified in the sample to obtain the proper type of equipment. The U.S. Environmental Protection Agency Project Officer also gave approval to substitute long haul diesel tractor trailer runs for three difficult-to-fill categories. This was done for four truck chases. Attached as Appendix C is a compilation of completed truck chases, by categories, compared to the Truck Chase Study sample requirements.

(2) Scheduling. Many companies found it difficult to know precisely when and where a particular truck might be used, making it almost impossible to schedule truck chases more than a day or two in advance. For instance, many moving companies were identified in the sample, but could not be scheduled because of the uncertainty of the time required to load household goods. Also, many of the trucks operated at times other than our basic eight-to-five, Monday through Friday schedule. Other truck operators who were difficult to schedule were contractors, tradesmen, and construction workers. These owners used their trucks to transport themselves to job sites, businesses, or residences. The trucks would then sit most of the day while work was performed. In general, the licensed trucking firms and business delivery truck owners proved to be the easiest to schedule.

Trucks were scheduled for a complete day of monitoring whenever possible. In those situations where the trucks were operated for only part of a day, the truck was scheduled for another day to complete data acquisition.

(3) Data Acquisition. The data acquisition procedure consisted of following the scheduled trucks with the instrumented vehicle, using a modified chase car technique and recording the chase vehicle's simulated truck or

bus operating characteristics on seven track magnetic tape. This chase car driving technique duplicates or simulates the operation of the pre-selected trucks or buses through acceleration, deceleration, cruising, brake applications, etc. until the trip was completed. A constant distance was maintained only during the chase mode; a catch-up mode was employed during those time periods when the truck or bus operation could not be simulated. A time lag was employed when accelerating or decelerating. The following variables were recorded on the magnetic tape:

1. Day of the year
2. Time of the day
3. Truck identification number
4. Area type
5. Vehicle speed
6. Manifold vacuum
7. Road types
8. Traffic conditions
9. Weather type
10. Driver-Navigator identification
11. Flag (mode indicator)
12. Type of scheduled stop

The time, speed, and manifold vacuum are recorded automatically. All other variables were input manually using auxiliary equipment channels operated by thumbwheel switches. The codes and procedure used to record the truck operating characteristics are outlined and contained in Appendix D.

Prior to or after the chase, other information (shown in Table 1) about the truck equipment and chase event was obtained, key-punched on computer cards, merged on computer tape with the operating characteristics, and sent to EPA.

TABLE 1

VEHICLE DATA INFORMATION

1. Model year
2. Chassis manufacturer
3. Axle configuration
4. Body style
5. Engine manufacturer
6. Number of engine cylinders
7. Engine serial numbers
8. Fuel type
9. Vehicle base location (zip code)
10. Vehicle operating range
11. Gross vehicle weight rating
12. Vehicle odometer reading
13. Listing license (from registration list)
14. Actual license
15. Owner's name, address and zip code
16. Major overhaul date
17. Minor overhaul date
18. Chase mileage

Appendix E contains the computer card lay-out of the Vehicle Data Information which was stacked on the nine-track computer tape along with the Truck Chase Data which was forwarded to EPA.

In many instances, the truck owners did not have all the vehicle data information and thus could not provide it. However, every effort was made to obtain the required data.

The actual truck chase procedure provided for the driving crew to meet the truck driver to be chased, fifteen minutes prior to the driver's normal starting time. This was done so the driving team could review chase procedures with the truck driver and determine the driver's route, in case the chase car became separated from the truck. Prior to the chase, vehicle data information was also obtained

from the driver and from the truck. Finally, two photographs of the truck or bus were taken. Photographs of trucks chased are included in Appendix F.

Once the truck chase began, the driving crew, besides operating the on-board computer, also maintained a log of the truck's route. For about the first 30 chases, this was done with a voice tape recorder activated by a foot pedal. Later, the crew switched to a written log. The route log was kept to aid in editing any coding errors as well as to have a record of any other problems that arose. This procedure proved invaluable during the study, not only for editing minor coding errors, but in diagnosing equipment problems. In addition to the voice log, the driving crew maintained a Daily-Trip-Log. This log contained such data as the truck operator's name, truck chase number, the meeting time and meeting place. It also contained the computer tape number, and starting and ending times.

(4) Data Processing. The data was recorded on seven-track magnetic tape at 200 bytes per inch (BPI) and processed and stacked on nine-track magnetic tape at 1600 BPI. The vehicle information, which had been key-punched on computer cards, was also processed and stacked on the nine-track magnetic tape. The computer tape format appears in Appendix F. In some instances, minor editing was necessary to correct coding errors.

Processed tapes were supplied to the U.S. Environmental Protection Agency Project Officer approximately every two weeks.

PROBLEMS

A number of problems developed during the course of the study, some minor, and several so serious the study had to be stopped while the equipment was checked or repaired. Early in the study, for example, the on-board computer tape recorder would not rewind. The driving crew, using a technique suggested by the U.S. Environmental Protection Agency Project Officer, was able to remedy this problem.

During the course of the study, four truck chase tape files were lost. On two separate occasions, during the third and fourth months of the study in extremely cold weather, recorded data was apparently not recorded, recorded improperly, or erased during recording or data processing. The data from eleven truck chases was lost. The study was suspended for three days while the equipment and data processing procedures were checked. These eleven truck chases had to be rescheduled and redone. During the fifth month the computer equipment completely failed, and the study was officially suspended. The instrumented vehicle was returned to the EPA facility in Ann Arbor, Michigan, where the equipment was repaired and tested.

In all, the data from fifteen truck chases was lost due to equipment failure.

Minor problems with the instrumented vehicle plagued the study. Most of the problems involved engine performance. When the computer in the instrumented vehicle is shut-down, it can not be restarted again from that point; in order to maintain continual data recording, therefore, it was necessary to keep the motor idling in the instrumented vehicle for long periods of time to power the computer. This caused the engine to heat up, and the plugs and points to deteriorate rapidly. Several engine tune-ups were necessary during the study.

RECOMMENDATIONS

Because of engine performance problems, it is recommended that in future studies of this nature, the computer equipment be modified to allow computer shut-down and re-starting during data acquisition. This should eliminate engine performance problems. According to paragraph 3-11, page 3-3 in Kennedy Company's "Operation and Maintenance Manual," such procedures can be developed.

APPENDIX A

TRUCK CHASE SAMPLE REQUIREMENTS

TRUCKS	Area of Operation			
GAS	LOCAL	SHORT	LONG	TOTAL
2 Axle	27	5	2	34
3 Axle	4	2	0	6
Tractor-Trailer	3	3	0	6
TOTAL	34	10	2	46
DIESEL				
2 Axle	3	0	0	3
3 Axle	3	0	0	3
Tractor-Trailer	3	5	5	13
TOTAL	9	5	5	19

	CITY	EXPRESS*	TOTAL
BUSES	2	3	5

*Non-Transit, Intercity, etc.

APPENDIX B

TRUCK OWNERS PARTICIPATION

	No.	% of Owners	% of Those Contacted
Truck owners declining	15	2.8	12.5
Truck owners with schedule conflict	17	3.2	14.1
Truck owners--runs cancelled	5	1.0	4.1
Truck owners contacted--trucks not used much	24	4.5	20.0
Total Non-Participating	61	11.5	50.8
Truck owners participating	59	11.2	49.2
Total Truck Owners Contacted	120	22.9	100.0
Truck Owners Not Contacted	407	77.0	--
TOTAL SAMPLE	527	100.0	100.0

APPENDIX C

TRUCK CHASE COMPLETED
BY CATEGORY

	LOCAL		SHORT		LONG		TOTAL	
	Required Number	Completed	Required Number	Completed	Required Number	Completed	Required Number	Completed
GAS								
2 Axle	27	27	5	4[1]	2	0[1]	34	31
3 Axle	4	4	2	2			6	6
Tractor-Trailer	3/34	3/34	3/10	2[1]/8	2	0	6/46	5/42[1]
DIESEL								
2 Axle	3	3[2]					3	3
3 Axle	3	3					3	3
Tractor-Trailer	3/9	3/9	5/5	5/5	5/5	5/5	13/19	13/19
BUSES	2	2	3	3			5	5
SUBSTITUTION RUNS[1]								
Tractor-Trailer (Diesel)						4		4
GRAND TOTAL							70	70

[1]Four substituted truck chases replace four of the truck chases in the regular truck sample.
[2]One three axle truck chase was substituted for one of the two axle truck chases.

APPENDIX D

RECORDING PROCEDURE AND CODING

The truck operating characteristic data was recorded on seven-track magnetic tape at 200 BPI using the first twenty-seven (27) bytes. The time, vehicle speed and manifold vacuum are recorded automatically. All other data items were input manually using auxillary equipment channels operated by thumbwheel switches. (See Figure 1 for graphic of display panel.) The following description shows the order for the truck chase operating characteristic data, as recorded and coded on computer magnetic tape:

Bytes	Heading and Codes
1-3	Day of Year. A three-digit numeric code corresponding to the Julian Day Calendar was used.
4-9	Time of Day. Six-digit Uniform or Military Time was automatically recorded.
10	Type of Stop. A one-digit numeric code was used to record the type of each stop: 0--Bus Stop 1--Operating 2--Stop - truck motor running 3--Stop - truck motor stopped 4--Lunch/dinner 6--Coffee break 7--Comfort 8--Other

During the normal truck chase operation, the code 1 (operating) was used. When a truck stopped for a prolonged period of time, the coding was handled in one of two ways depending on whether the truck engine was stopped or not. If the engine continued to run, the code 2 (Stop--truck motor running) was used. If the engine of the truck were stopped, the code 3 (Stop--truck motor stopped)was used. In both situations, the recorder was then stopped. The real time clock will account for the elapsed time during such occurances and provide continuity in the data acquisition.

However, there were two general ways to handle either situation, where the engine is running or stopped. For most truck chases, when a truck was stopped for prolonged periods of time, the recorder was stopped after the proper stop code was entered. This was done when the driving team could tell the truck would be stopped for a prolonged period of time. A running recorder indicates that the truck or bus engine was running. If the recorder is turned off, this indicates that the truck engine was stopped.

11-12 Truck Number. Two-Digit study identification number assigned to each truck.

13-15 Vehicle Speed. The vehicle speed was recorded automatically using three digits to the tenth.

16-18 Manifold Vacuum. A three-digit value was automatically recorded by the computer.

19 Flag. A one-digit numeric code was used to indicate the three recording modes:

0--Testing mode 1--Chase mode 2--Catch-up mode

Prior to the actual chase event, when the recording equipment was being tested, a code 0 was used. During the actual chase, a code 1 was used. When the chase car was not in the chase mode or was not in a proper position to duplicate the operation of a truck, the code 2 was used to indicate that the data was not valid truck simulation information.

20 Weather. A one-digit code was used to indicate weather conditions:

0--Clear: Hot
1--Clear: Warm
2--Clear: Cool

3--Cloudy: Hot
4--Cloudy: Warm
5--Cloudy: Cool

6--Light Rain
7--Moderate Rain
8--Heavy Rain
9--Rain Stop: Wet Pavement

21 Road Types. A one-digit code was used to indicate the type of road on which the truck was traveling, (See Map 1 for Functional classification of highways/streets within the St. Louis metropolitan area):

1--Freeway. Facilities with medians and multi-lane pavements with controlled access typified by on-and-off ramps, grade separations, and no traffic control devices.

2--Arterials. Facilities where traffic flow has priority (few or no STOP signs),and which have the capacity to carry high traffic volumes.

3--Collector and Local. Facilities generally not included above, but typified by frequent STOP signs at intersections, low capacity design, low speed limits and less than three lanes of traffic.

22 Blank Field

23 Traffic Conditions. Three codes were used to indicate level of service:

1--Free (Level of Service A). Traffic flow where speeds are controlled by driver choice and desires, speed limits and physical roadway conditions. Speeds are relatively unaffected by presence of other vehicles.

2--Stable (Levels of Service B and C). Traffic flow where speeds and maneuverability are restricted by traffic conditions; however, the increased traffic volumes permit satisfactory progress even though they somewhat restrict free choice of lane and speed.

3--Congested (Levels of Service D, E and F). Traffic flow characterized by driver discomfort, slow speeds with frequent stops and, at times, moderate lines of vehicles.

24 Area Type Codes. Four area codes were used:

1--Central Business District
2--Central City
3--Suburban
4--Rural

Map 2 indicates the area boundaries in the St. Louis Metropolitan Region. When the truck chase went outside the region, the codes used were based on the judgment of the driving crew.

25 Turns. Three codes were used to indicate normal operating and turning movements:

0--Operating
1--Right
9--Left

26 Driver. A one-digit numeric code was used to indicate the driver of the chase:

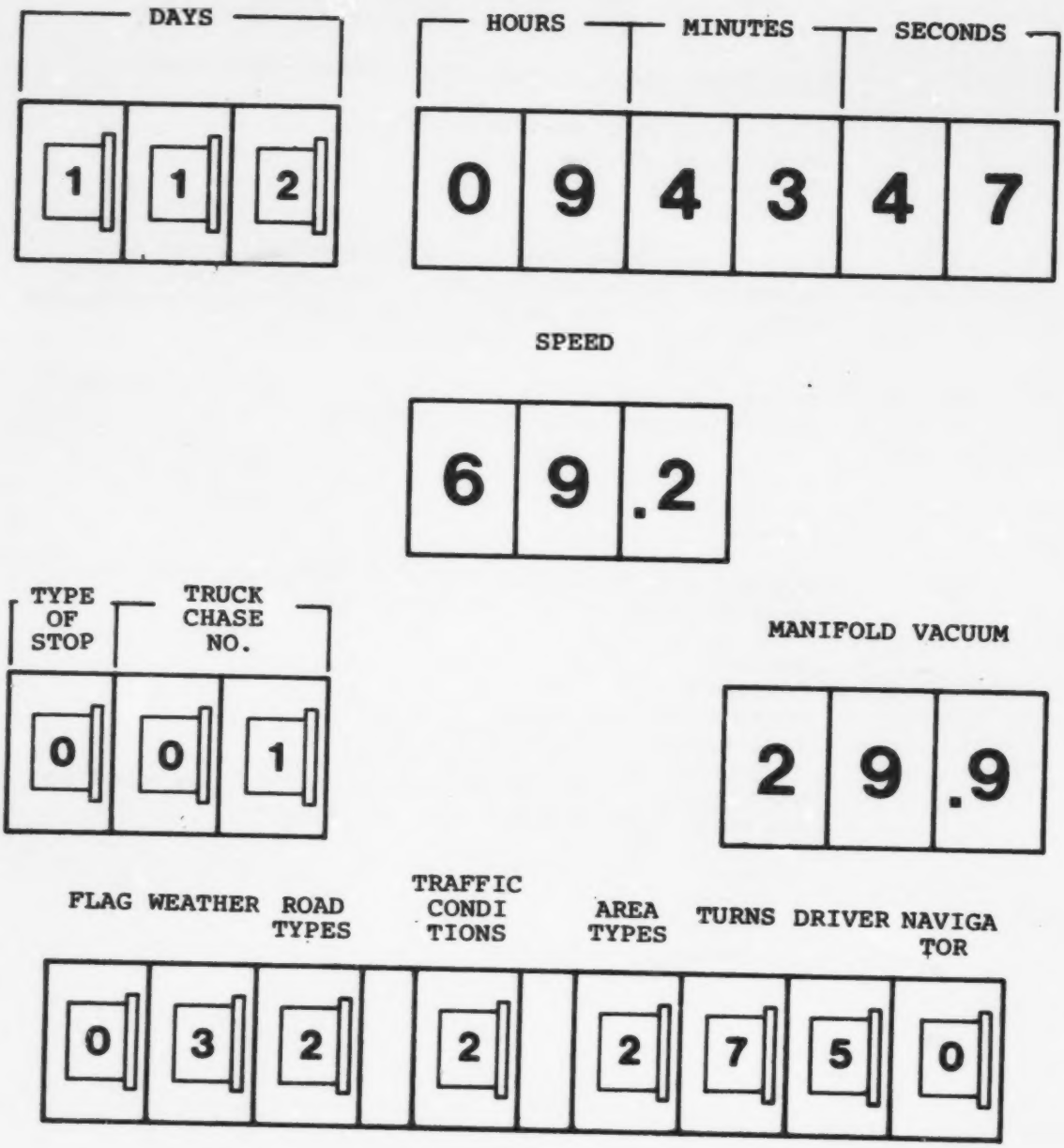
0--Rook
1--Brown
2--Yandell
3--Sheehan

27 Navigator. A one-digit numeric code was used to indicate the navigator of the chase:

0--Rook
1--Brown
2--Yandell
3--Sheehan

FIGURE 1

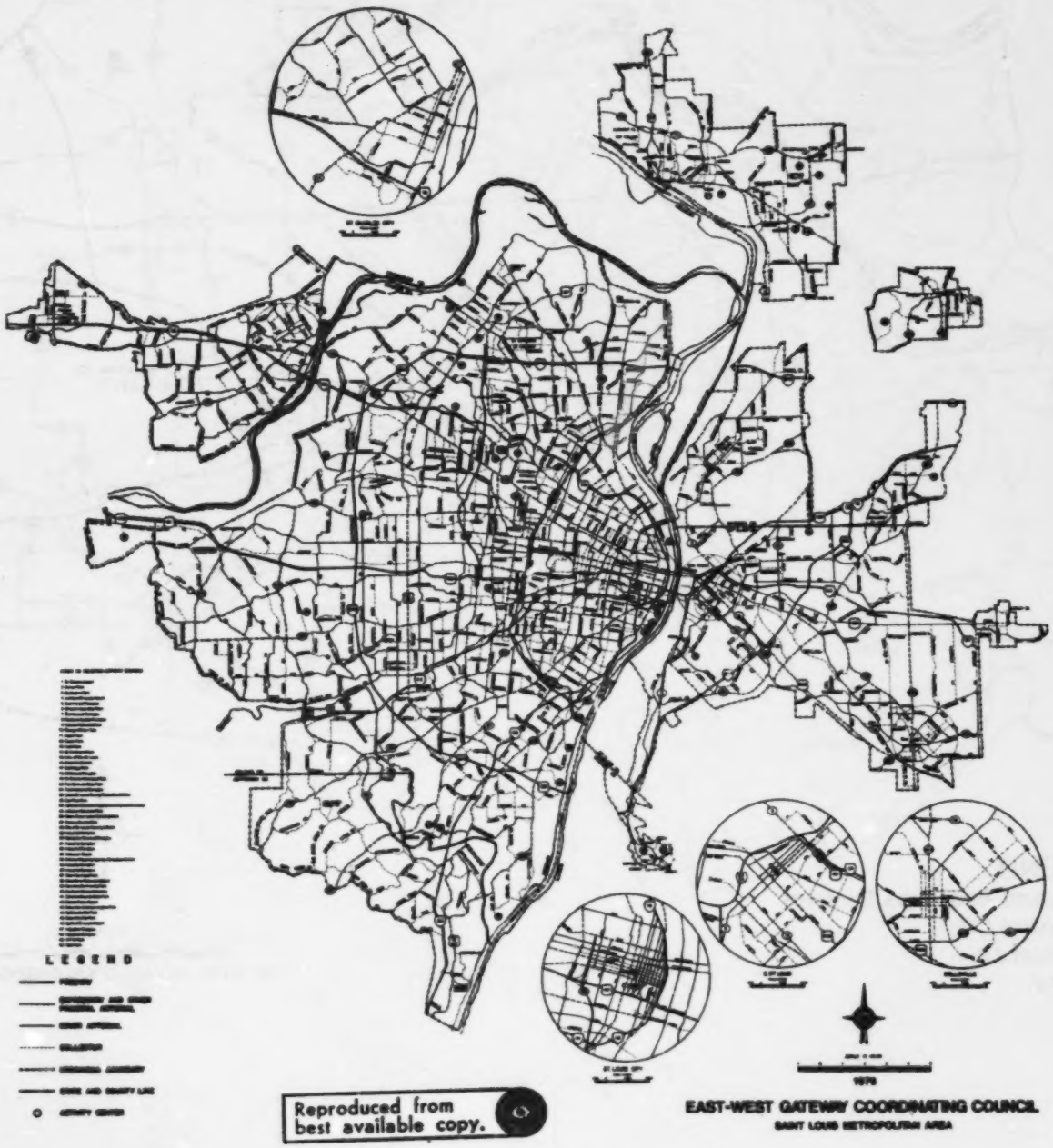
CONTROL DISPLAY PANEL



MAP 1

FUNCTIONAL CLASSIFICATION

ST. LOUIS REGIONAL HIGHWAY SYSTEM



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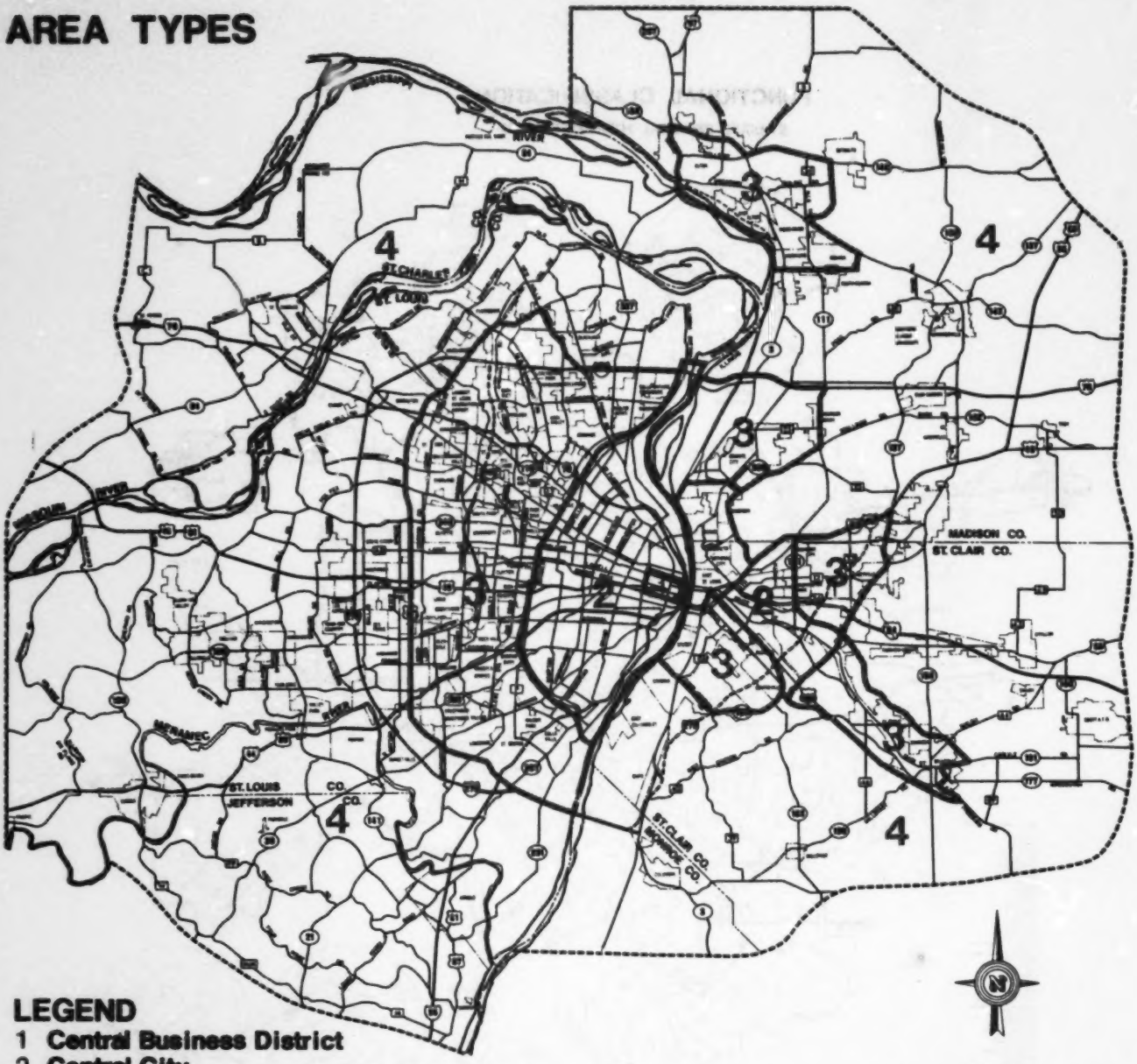
SAINT LOUIS METROPOLITAN AREA

MAP 2

AREA TYPES



LEGEND

1 Central Business District
2 Central City
3 Suburban
4 Rural

SCALE IN MILES
0 1 2 3 4 5 6 7 8 9 10

EAST-WEST GATEWAY COORDINATING COUNCIL

APPENDIX E

COMPUTER CARD LAY-OUT

Card I

Column Numbers	
1-2	Truck number--Two digit code from 01 to 70 for each truck or bus. Corresponds to truck chase number recorded on computer tape during chase.
3-6	Model Year--Four digits used for actual model year of truck or bus.
7-16	Chassis Manufacturer--Ten alpha spaces for name of manufacturer.
17-26	Body Type--10 spaces, alpha and numeric. See attached truck and bus nomenclature description and coding definitions.
27-38	Occupational Use--Twelve alpha characters
39-48	Body Style--Ten alpha characters.
49-58	Engine Manufacturer--Ten alpha characters.
59-60	Number of cylinders--Actual number of cylinders.
61-74	Engine Serial Number--Fourteen (14) alpha and numeric characters.
75	Fuel type--G for gas, D for diesel fuel.
76-80	Vehicle location zip code--Five digits, zip code of vehicle's location.

Card II

Column Numbers	
1-5	Vehicle Operating Range--Local, short and long.
6-7	Gross Vehicle Weight--2 digit code used to indicate gross vehicle weight in thousands.
8-10	Odometer Reading--Three digit odometer reading of the truck or bus in thousands.
11-22	Registration license number. Twelve digits alpha and numeric.
23-28	Actual License Number--Six digit alpha and numeric
29-40	Owners Name--Twleve alpha characters.
41-50	Address--Ten alpha and numeric characters. Address of owner.
51-60	City--Ten alpha characters.
61-63	State--Three alpha characters.
64-68	Zip Code--Five digit zip code of owner.
69-72	Major Overhaul Date--Four digit code; 69 and 70 are the month, 71 and 72, the year.
73-76	Minor Overhaul Date--Same as major.
77-80	Chase Mileage.

Truck and Bus Nomenclature Description and Coding Definitions

The coding is based on the use of the digit system of identifying combinations of axles. Each digit indicates the number of axles on a vehicle which is entirely supported on its own wheels, such as a motor truck or full trailer.

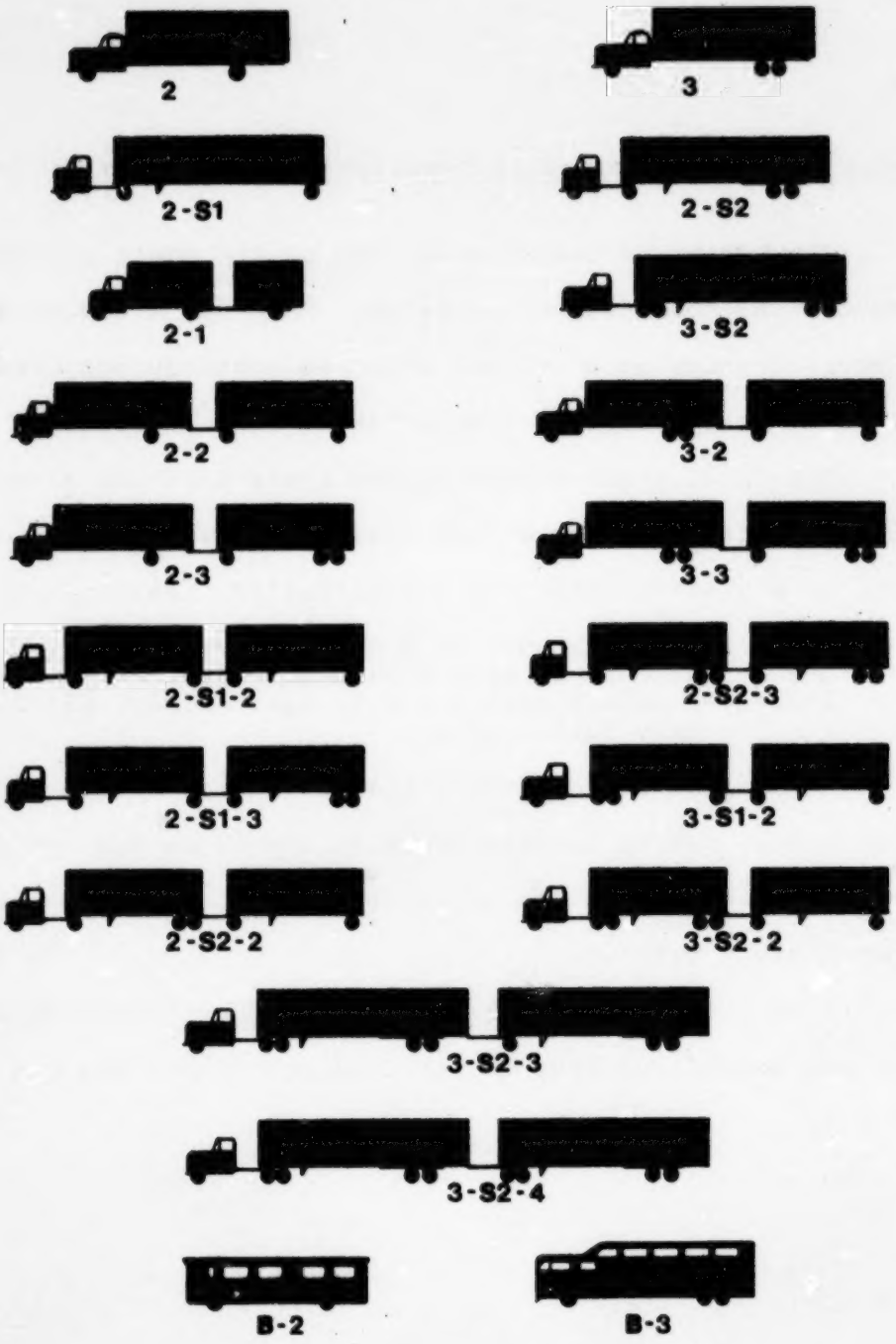
The first digit refers to the power unit and a second single digit refers to a full trailer, while a second digit with an S prefix, refers to a semitrailer. For example:

2-S1--2 axle tractor and 1 axle semitrailer
3-2 --3 axle truck with 2 axle full trailer
2-S1-2--2 axle tractor, 1 axle semitrailer, and 2 axle full trailer

A semitrailer is a truck trailer equipped with one or more axles, and so constructed that the front end and a substantial part of its own weight and that of its load rests upon a truck tractor.

A full trailer is a truck trailer constructed so all of its own weight and that of its load rests upon its own wheels.

TRUCK & BUS NOMENCLATURE



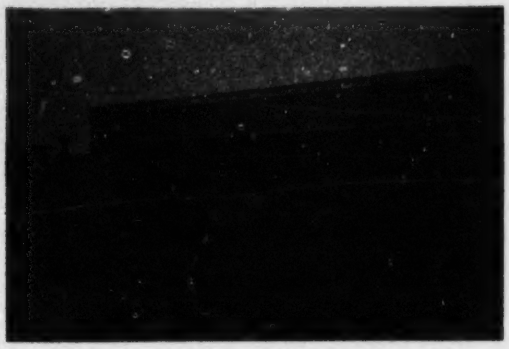
NOTE: See following page for definitions.

APPENDIX F

PHOTOGRAPHS OF TRUCKS AND BUSSES

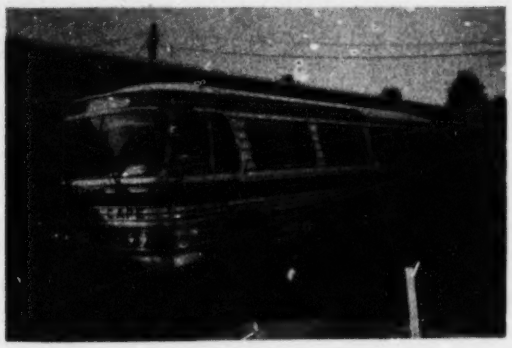
KEY TO PHOTOS

Truck Chase	Chasis Mfg.	Truck Nomenclature
Fuel Type	Operating Range	Gross Vehicle Weight



#1 International 3-S2
Diesel Local 72,000 GVW

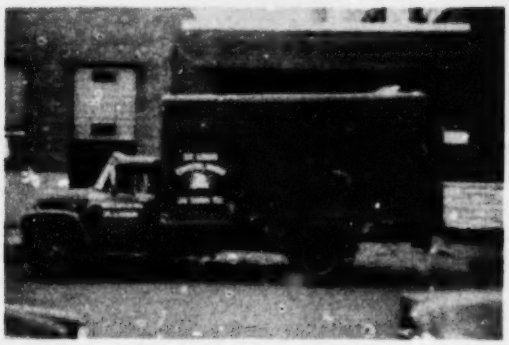
#5 Chevrolet 2-S1
Gasoline Local 54,000 GVW



#2 GMC B-2
Diesel Short 28,000 GVW

#6 International S-1
Diesel Local 54,000 GVW

#3 Mack 3-S2
Diesel Local 72,000 GVW



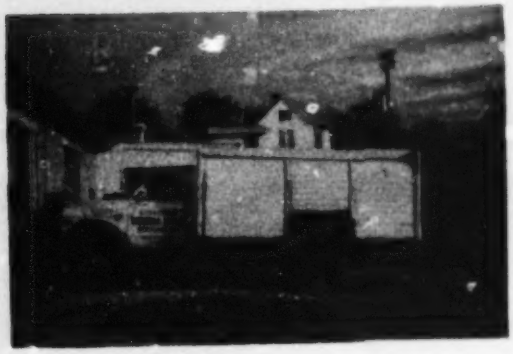
#7 International 2
Gasoline Local 24,000 GVW

#4 Ford 2
Gasoline Local 24,000 GVW

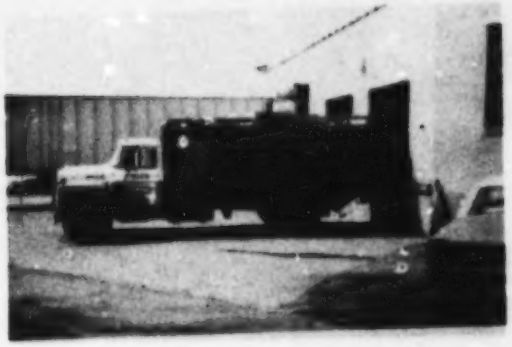
#8 GMC B-2
Diesel Short 28,000 GVW

#9 Ford 2
Gasoline Short 12,000 GVW

#13 Ford 2
Gasoline Local 12,000 GVW



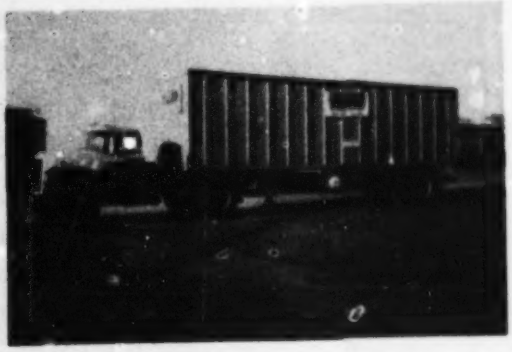
#10 Chevrolet 2
Gasoline Short 18,000 GVW



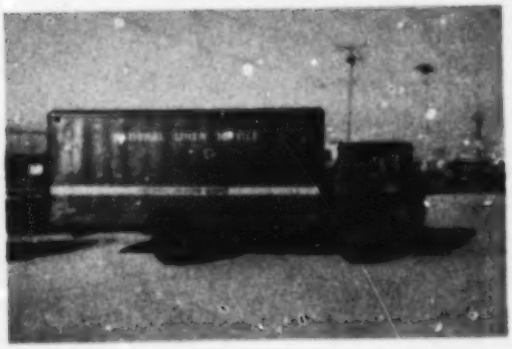
#14 International 2
Gasoline Local 24,000 GVW

#11 International 2-S2
Gasoline Local 30,000 GVW

#15 Chevrolet 2
Gasoline Local 24,000 GVW



#12 International 2-S1
Gasoline Local 48,000 GVW



#16 Chevrolet 2
Gasoline Local 18,000 GVW

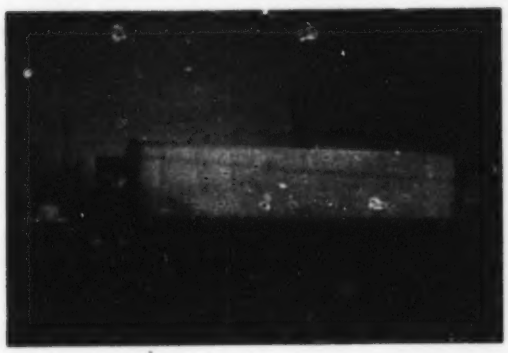
#17 Chevrolet 2
Gasoline Local 30,000 GVW

#21 Ford 2-S2
Gasoline Short 60,000 GVW

#18 Chevrolet 2
Gasoline Local 12,000 GVW

#22 White 3-S2
Diesel Long 72,000 GVW

#19 A.M. General B-2
Diesel Local 24,000 GVW

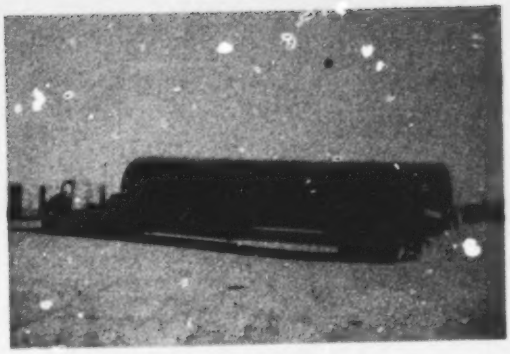


#23 Ford 2
Gasoline Local 12,000 GVW

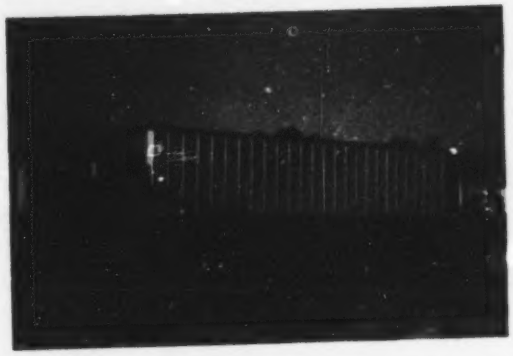
#20 GMC 2-S1
Diesel Short 60,000 GVW

#24 Ford 2
Gasoline Local 18,000 GVW

#25 International 2-S2
Diesel Long 72,000 GVW

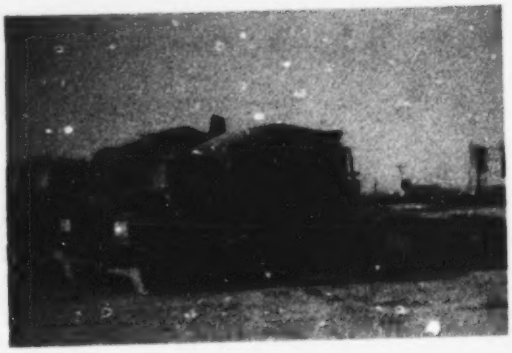


#29 Ford 3-S2
Diesel Long 72,000 GVW

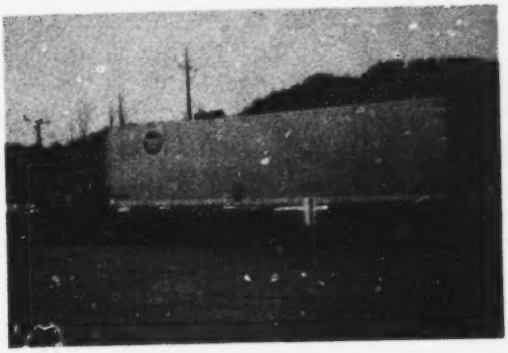


#26 GMC 2-S2
Diesel Local 72,000 GVW

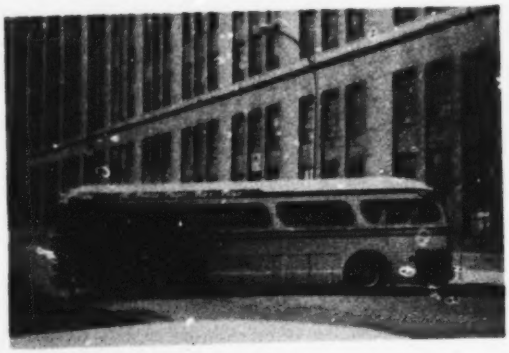
#30 White 3-S2
Diesel Long 72,000 GVW



#27 Mack 3
Diesel Local 72,000 GVW



#31 International 3-S2
Diesel Short 72,000 GVW

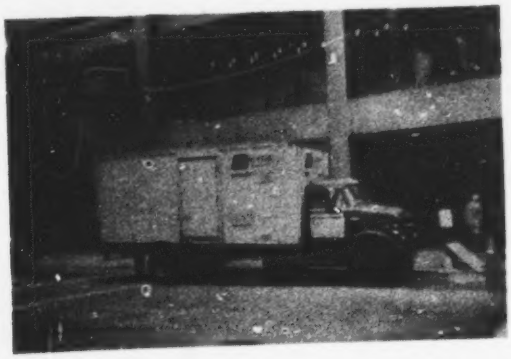


#28 GMC B-2
Diesel Short 27,000 GVW

#32 Ford 2
Gasoline Local 12,000 GVW

#33 International 2
Gasoline Short 24,000 GVW

#37 White 3-S2
Diesel Short 72,000 GVW



#34 Ford 2
Gasoline Local 24,000 GVW

#38 GMC B-2
Diesel Short 27,000 GVW

#35 International 2
Gasoline Local 30,000 GVW

#39 International 2
Gasoline Local 24,000 GVW

#36 Ford 2
Gasoline Local 24,000 GVW

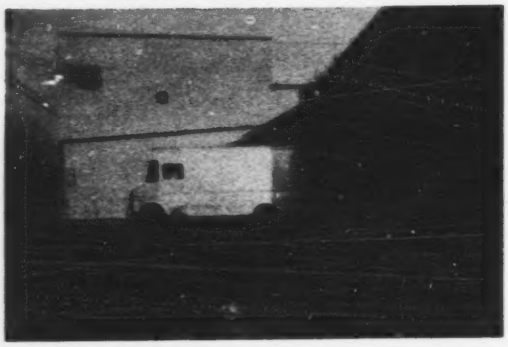
#40 International 3
Diesel Local 48,000 GVW

#41 Chevrolet 2
Gasoline Local 12,000 GVW

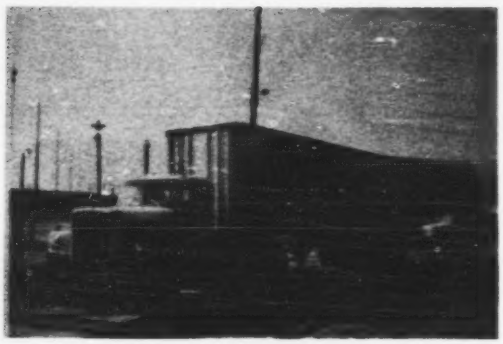
#45 International 2
Gasoline Local 18,000 GVW

#42 Ford 2
Gasoline Local 12,000 GVW

#46 White 3-S2
Diesel Long 72,000 GVW

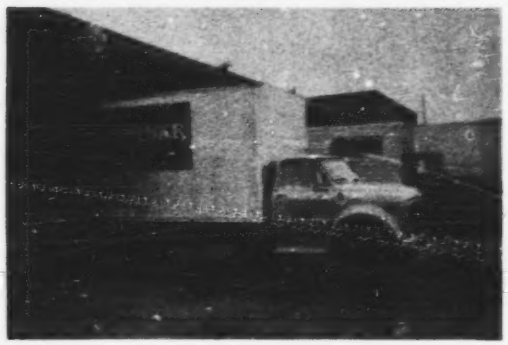


#43 Ford 2
Gasoline Short 12,000 GVW



#47 White 3-S2
Diesel Short 72,000 GVW

#44 Ford 2
Gasoline Local 18,000 GVW



#48 Chevrolet 2
Gasoline Local 18,000 GVW

#49 International 2-S2
Gasoline Local 48,000 GVW

#53 Dodge 2
Gasoline Local 24,000 GVW

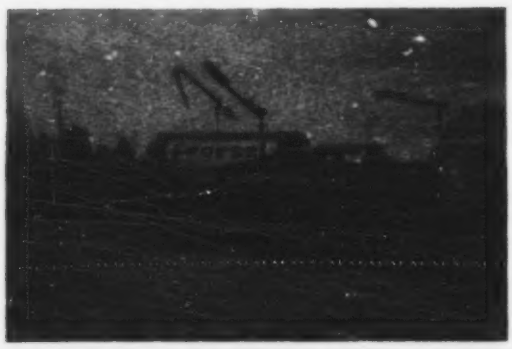
#50 Ford 2
Gasoline Local 12,000 GVW

#54 International 3
Gasoline Local 48,000 GVW

#51 Ford 2
Gasoline Local 12,000 GVW

#55 International 2
Gasoline Local 30,000 GVW

#52 GMC 3
Gasoline Local 42,000 GVW



#56 Ford 2
Gasoline Local 30,000 GVW

#57 Ford 3
Diesel Local 54,000 GVW

#61 International 3
Gasoline Local 48,000 GVW

#58 International 3-S2
Diesel Short 72,000 GVW

#62 Ford 2-S1-2
Diesel Long 72,000 GVW

#59 International 3
Gasoline Short 42,000 GVW

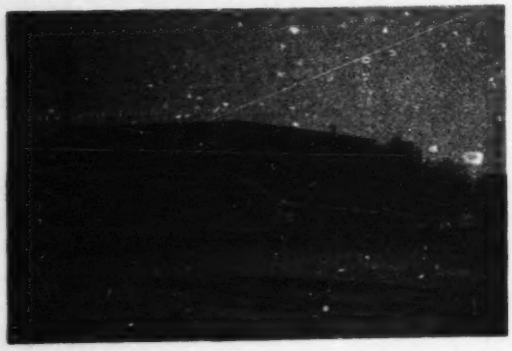
#63 White 2
Gasoline Local 30,000 GVW

#60 Ford 2
Diesel Local 24,000 GVW

#64 Ford 2-S1
Diesel Short 48,000 GVW

#65 Ford 3
Gasoline Local 24,000 GVW

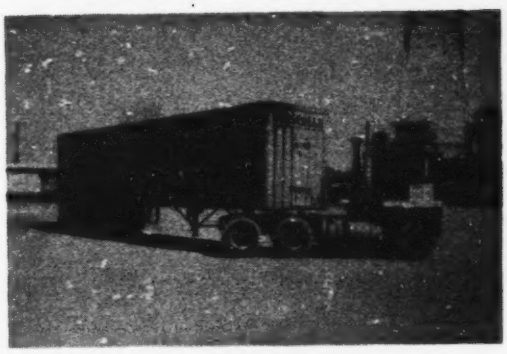
#68 GMC 3
Gasoline Short 30,000 GVW



#66 Hendrickson 3-S2
Diesel Short 44,000 GVW

#69 International 3
Gasoline Short 45,000 GVW

#67 Ford 2
Diesel Local 18,000 GVW



#70 Kenworth 3-S2
Diesel Long 73,000 GVW